

The production of many foods that people eat every day involve either alcoholic fermentation or lactic acid fermentation. Three important foods are bread, yogurt, and cheese.

Bread is often made by mixing flour, milk, and sugar with a microorganism you know as yeast. Yeast runs out of oxygen and uses fermentation to convert the sugar into alcohol and carbon dioxide. Bubbles of carbon dioxide gas forming inside the dough cause it to rise. When the dough is baked, the small amount of alcohol evaporates, the yeast is killed, and the carbon dioxide bubbles give the bread a light, spongy structure.

Some bacteria release energy through lactic acid fermentation. These bacteria convert the sugar found in milk into lactic acid and are used to make yogurt, cheese, and sourdough bread. Lactic acid changes the acidity of a bread mixture to give it a slightly sour flavor. In yogurt and cheese, the buildup of lactic acid causes the milk to partially solidify, producing the creamy texture of yogurt. If fermentation continues for a long time, the milk eventually turns into cheese.

INVESTIGATE Fermentation

How can you tell if fermentation releases material?

PROCEDURE

- ① Add 1/2 teaspoon of yeast to the empty water bottle.
- ② Fill the bottle about three-quarters full with the sugar solution.
- ③ Place the balloon tightly around the mouth of the bottle.
- ④ Gently swirl the bottle to mix the yeast and sugar solution.
- ⑤ After 20 minutes, observe the balloon and record your observations.

WHAT DO YOU THINK?

- What changes did you observe? What do you think is the source of energy that caused these changes?
- What accounts for the change in the amount of gas inside the balloon?

CHALLENGE Design an experiment to answer the following question. How might the temperature of the sugar solution affect the process?

SKILL FOCUS

Observing

MATERIALS

- dry yeast
- spoon
- small water bottle
- warm sugar solution
- balloon

TIME
30 minutes

